C L A I M S

1. A method of manufacturing an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect said electron emission portions are disposed on a substrate, said method characterized by comprising:

a wiring forming step of forming the wiring on said substrate; and

an electron emission portion forming process of forming said electron emission portions on said substrate;

wherein an electric field applying process of applying a given electric field to said substrate on which said wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed.

2. The method of manufacturing the electron beam device according to claim 1, characterized in that said electric field is 1 kV/mm or more in its electric field intensity.

3. The method of manufacturing the electron beam device according to claim 1, characterized in that said electric field applying step comprises a step of discharging, by application of said electric field, electricity from a portion of said substrate from which

electricity is liable to be discharged in various processes after said electric field applying process including said electron emission portion forming process, or when said electron beam device is used, to thereby change said portion into a shape which is difficult to discharge electricity.

4. The method of manufacturing the electron beam device according to claim 1, characterized in that said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from said wirings in correspondence with said respective electron emission portions, and said electric field applying step is conducted before said electrode forming step is conducted.

5. The method of manufacturing the electron beam device according to claim 4, characterized in that said pair of electrodes comprise a pair of electrodes that constitute surface conduction type electron emission elements.

6. The method of manufacturing the electron beam device according to claim 5, characterized in that said electrode forming step comprises a step which includes a thin film forming step of forming an

electrically conductive thin film on said substrate, and produces a gap in said formed electrically conductive thin film and constitutes said pair of electrodes by said electrically conductive thin films which exists on both sides of said gap.

7. The method of manufacturing the electron beam device according to claim 6, characterized in that said electric field applying step is conducted before said thin film forming step is conducted.

8. The method of manufacturing the electron beam device according to claim 6, characterized in that said electric field applying step is conducted after said thin film forming step is completed and before the gap is produced in said electrically conductive thin film.

9. The method of manufacturing the electron beam device according to claim 4, characterized in that said pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element.

10. The method of manufacturing the electron beam device according to claim 9, characterized in that said electric field emission type electron emission

element comprises said emitter that emits electrons from an end portion and said gate that produces an electric field between said end portion and said gate.

11. The method of manufacturing the electron beam device according to claim 9 or 10, characterized in that said electric field applying step is conducted before said emitter is formed.

12. The method of manufacturing the electron beam device according to claim 11, characterized in that said electric field applying step is conducted before said gate is formed.

13. The method of manufacturing the electron beam device according to claim 12, characterized in that said plurality of electron emission portions are connected onto one main surface of said substrate in the form of a ladder or a matrix by said wirings.

14. The method of manufacturing the electron beam device according to claim 13, characterized in that, in said electric field applying step, an electrode is disposed opposite to a surface of said substrate on which said wirings are disposed, and a voltage is applied between said electrode and the wirings on said substrate to apply said electric field.

15. The method of manufacturing the electron beam device according to claim 13, characterized in that a voltage given between said electrode and said wirings is changed during said electric field applying step.

16. The method of manufacturing the electron beam device according to claim 13, characterized in that a distance between said electrode and said wirings is changed during said electric field applying step.

17. The method of manufacturing the electron beam device according to claim 13, characterized in that a current limit resistor is connected between said electrode and said power supply that applies a voltage to said electrode.

18. The method of manufacturing the electron beam device according to claim 13, characterized in that said electric field applying step is conducted in a vacuum atmosphere.

19. A method of manufacturing an image forming apparatus that includes an electron source in which a plurality of electron source elements each having a pair of element electrodes formed on a substrate, an electrically conductive thin film which are

electrically connected to each of said element electrodes, and an electron emission portion formed on a part of said electrically conductive thin film are formed on the same substrate, and said element electrodes of said respective electron source elements are connected in the form of a ladder or a matrix by wirings; and an image forming member disposed opposite to said electron source on said substrate, said method characterized by comprising: an electric field applying step of applying a given electric field to said substrate on which said wirings are formed after a step of forming said wirings is completed and before a step of forming said electron emission portions is completed.

20. The method of manufacturing an image forming apparatus according to claim 19, characterized in that a control electrode which controls the electron beam emitted from said respective electron source elements in response to an information signal is combined.

21. The method of manufacturing an electron beam device according to claim 1, characterized in that said electric field applying step is conducted in such a manner that said electrode for applying the electric field and said substrate are disposed opposite to each

other to apply a voltage between said electrode and said wirings, and an energy stored in the capacitor formed of said electrode and said substrate is equal to or less than an energy that destroys said electrically conductive thin film.

22. A method of manufacturing an electron beam device that includes a plurality of surface conduction type electron emission elements, said method characterized by comprising:

a step of forming plural pairs of element electrodes on a substrate;

a step of connecting a plurality of row-directional wirings and a plurality of column-directional wirings which are stacked one on another through an insulating layer to the respective electrodes of said plural pairs of element electrodes to form common wirings in a matrix;

a step of forming electrically conductive thin films between each pair of element electrodes;

a forming step of forming electron emission portions by conducting an electrifying process on said electrically conductive thin films between each pair of element electrodes; and

a conditioning step of applying said electric field by applying a voltage between said electrode and said common wiring in which an electrode for applying

an electric field to a surface having said common wirings and said substrate are disposed opposite to each other;

wherein said conditioning step is conducted under the condition where an energy stored in a capacitor formed of said electrode and said substrate is equal to or less than an energy that destroys said electrically conductive thin film.

23. The method of manufacturing an electron beam device according to claim 22, characterized in that, assuming that an area where said electrode and said substrate face each other is S, a distance between said electrode and said substrate is Hc, a voltage applied between said electrode and said common wiring is Vc, a dielectric constant of vacuum is ε, and an energy by which said electrically conductive thin film is destroyed is Eth, said conditioning step is conducted under the following condition:

$$\varepsilon \times S \times Vc^2 / 2Hc < Eth \quad .....(1)$$

24. The method of manufacturing an electron beam device according to claim 22, characterized in that a plurality of electrodes for applying said electric field are used in said conditioning step.

25. The method of manufacturing an electron

beam device according to claim 22, characterized in that a relative position between said electrode and said substrate is changed in said conditioning step.

26. A method of manufacturing an image forming apparatus that includes a substrate on which a plurality of surface conduction type electron emission elements are formed, and an image forming member which is disposed opposite to said surface conduction type electron emission elements on said substrate, said method characterized by comprising:

a step of forming plural pairs of element electrodes on a substrate;

a step of connecting a plurality of row-directional wirings and a plurality of column-directional wirings which are stacked one on another through an insulating layer to the respective electrodes of said plural pairs of element electrodes to form common wirings in a matrix;

a step of forming electrically conductive thin films between each pair of element electrodes;

a forming step of forming electron emission portions by conducting an electrifying process on said electrically conductive thin films between each pair of element electrodes; and

a conditioning step of applying said electric field by applying a voltage between said electrode and

said common wiring in which an electrode for applying an electric field to a surface having said common wirings and said substrate are disposed opposite to each other;

wherein said conditioning step is conducted under the condition where an energy stored in a capacitor formed of said electrode and said substrate is equal to or less than an energy that destroys said electrically conductive thin film.

27. A method of manufacturing an electron beam device that includes a first plate with an electron beam source which generates an electron beam, said method characterized by comprising:

a step of applying a voltage between said first plate and an electrode which is opposite to said first plate;

wherein in said step, a voltage that allows a leader current to flow is applied between said first plate and an electrode which is opposite to said first plate.

28. The method of manufacturing an electron beam device according to claim 27, characterized in that said voltage is a voltage which can maintain a state in which said leader current flows.

29. A method of manufacturing an electron beam device that includes a first plate with an electron beam source which is formed of an electrically conductive film and generates an electron beam, said method characterized by comprising:

a step of applying a voltage between said first plate and an electrode which is opposite to said first plate;

wherein in said step, a voltage with an influence of which on said electrically conductive film can be permitted is applied.

30. A method of manufacturing an image forming apparatus that includes a rear plate on which an electron beam source is formed and a face plate on which a phosphor that emits a light by irradiation of an electron beam is formed, said method characterized by comprising:

a step of applying a high voltage to a substrate on which an electrode is formed before a vacuum vessel including said rear plate and said face plate therein is formed.

31. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said high voltage applying step is conducted on a rear plate substrate on which said electrode is

formed before an electron beam source is completed.

32. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said high voltage applying step is conducted in vacuum.

33. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said high voltage applying step is conducted in gas.

34. The method of manufacturing an image forming apparatus according to claim 30, characterized in that a high voltage is applied between said substrate on which said electrode is formed and a dummy face plate with a counter electrode.

35. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said substrate on which said electrode is formed has a feeder wiring to the electron emission element, and the high voltage is applied with the wiring as one electrode and the dummy face plate as the other electrode.

36. The method of manufacturing an image

forming apparatus according to claim 30, characterized in that said substrate on which said electrode is formed has a plurality of row-directional wirings and a plurality of column-directional elements for feeder so as to wire a plurality of electron emission elements in a matrix, all of the row-directional wirings and the column-directional wirings are made common wiring, and the high voltage is applied with the row-directional and column-directional wirings as one electrode and the dummy face plate as the other electrode.

37. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said high voltage is a d.c. voltage that gradually steps up from a low voltage.

38. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said high voltage is an a.c. voltage that gradually steps up from a low voltage.

39. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said high voltage is a pulse voltage that gradually steps up from a low voltage.

40. The method of manufacturing an image

forming apparatus according to claim 30, characterized in that said electron beam source is a cold cathode element.

41. The method of manufacturing an image forming apparatus according to claim 30, characterized in that said electron beam source is a surface conduction type emission element.

42. A method of manufacturing an image forming apparatus that includes a rear plate with an electron beam source, a face plate on which a phosphor that emits a light by irradiation of an electron beam is formed, and a structure support disposed between said rear plate and said face plate, said method characterized by comprising:

a step of applying a high voltage between said face plate and said rear plated after said face plate, said rear plated and said structure support are assembled together into a panel; and

a step of forming an electron source after said high voltage applying step.

43. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said high voltage applying step is conducted in vacuum.

44. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said high voltage applying step is conducted by introducing gas within the image forming apparatus.

45. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said electron beam source has a plurality of electron emission elements connected to each other by a plurality of wirings, and in said high voltage applying step, said plurality of wirings are commonly grounded, and said high voltage is applied to said face plate.

46. The method of manufacturing an image forming apparatus according to claim 45, characterized in that said structure support has a rectangular shape and is disposed between said electron beam source and said face plate so that its longitudinal direction is in parallel with said plurality of wirings.

47. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said electron source has a plurality of electron emission elements which are wired in a matrix by a plurality of row-directional wirings and a plurality of column-directional wirings, and in said high voltage applying step, said plurality of row-

directional wirings and said plurality of column-directional wirings are commonly grounded, and said high voltage is applied to said face plate.

48. The method of manufacturing an image forming apparatus according to claim 47, characterized in that said structure support is disposed between said electron beam source and said face plate so that its longitudinal direction is in parallel with any one of said plurality of row-directional wirings and said plurality of column-directional wirings.

49. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said high voltage is an a.c. voltage with a peak value of which gradually steps up from a low voltage.

50. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said high voltage is a pulse voltage with a peak value of which gradually steps up from a low voltage.

51. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said high voltage is a monotonic increase

voltage which gradually steps up from a low voltage.

52. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said electron beam source is a cold cathode element.

53. The method of manufacturing an image forming apparatus according to claim 42, characterized in that said electron beam source is a surface conduction type emission element.

54. The method of manufacturing an image forming apparatus according to claim 53, characterized in that said electron source forming step includes an electrification forming step.

55. The method of manufacturing an image forming apparatus according to claim 53, characterized in that said electron source forming step includes an electrification activating step.

56. A method of manufacturing an electron beam device that includes a first plate with an electron beam source which generates an electron beam and an electrode which is opposite to said first plate, said method characterized by comprising:

a first step of applying a voltage between said first plate and said electrode; and

a step of forming said electron beam source after said first step.

57. The method of manufacturing an electron beam device according to claim 56, characterized in that said electron beam source forming step conducted after said first step comprises a step of forming a high resistant portion on an electrically conductive film by electrifying said electrically conductive film.

58. The method of manufacturing an electron beam deivice according to claim 56, characterized in that said electron beam source forming step after said first step comprises a step of depositing a deposit on an electron emission portion, a portion close to the electron emission portion, or said electron emission portio and said portion close to the electron emission portion.

59. The method of manufacturing an image forming apparatus according to claim 56, characterized in that said first step is conducted after wirings are formed on said first plate.

60. The method of manufacturing an electron

beam device according to claim 56, characterized in that said first step is conducted after an electrically conductive thin film in which the electron emission portion is formed is formed.

61. The method of manufacturing an electron beam device according to claim 56, characterized in that a current flows between said first plate and said electrode by applying a voltage between said first plate and said electrode.

62. The method of manufacturing an electron beam device according to claim 61, characterized in that a current flows by discharge generated between said first plate and said electrode.

63. A method of manufacturing an image forming apparatus including a conditioning step of disposing an electrode at a position opposite to an electron source substrate that constitutes an electron source and applying a high voltage between said electrode and an electron source substrate in a step of manufacturing said electron source that constitutes an image forming apparatus, said method characterized by comprising:

plural kinds of conditioning steps where the sheet resistances of said electrodes are different, respectively.

64. The method of manufacturing an image forming apparatus according to claim 63, characterized in that a high voltage is applied between said electron source substrate and said electrode with said electron source substrate side as a cathode.

65. The method of manufacturing an image forming apparatus according to claim 63, characterized by further comprising:

an electrode forming step of forming an element electrode on said electron source substrate;

a first conditioning step conducted after said electrode forming step;

a thin film forming step of forming an electrically conductive thin film between said element electrodes after said first conditioning step;

a second conditioning step conducted by an electrode with a sheet resistance of which is larger than that in said first conditioning step after said thin film forming step;

an electron emission portion forming step of forming an electron emission portion in said electrically conductive thin film after said second conditioning step;

a third conditioning step conducted by an electrode with a sheet resistance of which is larger than that in said second conditioning step after said

electron emission portion forming step; and

a fourth conditioning step conducted by an electrode with a sheet resistance of which is smaller than that in said first conditioning step after said third conditioning step.

66. A method of manufacturing an image forming apparatus including a conditioning step of disposing an electrode at a position opposite to an anode substrate that constitutes an anode and applying a high voltage between said electrode and an anode substrate in a step of manufacturing said anode that constitutes an image forming apparatus, said method characterized by further comprising:

plural kinds of conditioning steps where the sheet resistances of said electrodes are different, respectively.

67. The method of manufacturing an image forming apparatus according to claim 66, characterized in that a high voltage is applied between said anode substrate and said electrode with said anode substrate side as an anode.

68. The method of manufacturing an image forming apparatus according to claim 66, characterized by further comprising: a fluorescent film forming step

of forming a fluorescent film that emits a light by allowing electrons to collide with said anode substrate; a first conditioning step which is conducted after said fluorescent film forming step; and a second conditioning step which is conducted by the electrode which is smaller in sheet resistance than that in said first conditioning step after said first conditioning step.

69. The method of manufacturing an image forming apparatus according to claim 63, characterized by further comprising conditioning steps in which the electric field intensities formed between said substrate and said electrode are different, respectively.

70. The method of manufacturing an image forming apparatus according to claim 69, characterized in that at least one of a voltage value which is applied to said electrode and a distance between said substrate and said electrode is changed to make the electric field intensities different, respectively.

71. A method of manufacturing a plate type image forming apparatus that includes a cathode substrate on which an electron beam source is disposed, and an image formation anode substrate disposed

opposite to said cathode substrate, characterized in that a high voltage is applied to an anode disposed opposite to said cathode substrate with said cathode substrate as a cathode, and abnormal discharge generated by application of said high voltage is detected to suppress said abnormal discharge during manufacturing of said cathode substrate.

72. A method of manufacturing a plate type image forming apparatus that includes a cathode substrate on which an electron beam source is disposed, and an image formation anode substrate disposed opposite to said cathode substrate, characterized in that a high voltage is applied to an anode disposed opposite to said cathode substrate with said cathode substrate as a cathode, and abnormal discharge generated by application of said high voltage is detected, and the potential of said anode is allowed to approach the potential of said cathode to suppress said abnormal discharge during manufacturing of said cathode substrate.

73. The method of manufacturing an image forming apparatus according to claim 71, characterized in that the abnormal discharge is detected to electrically cut off said anode and the high voltage power supply connected to said anode.

74. The method of manufacturing an image forming apparatus according to claim 71, characterized in that said cathode substrate is a plurality of surface conduction type electron emission elements disposed in a matrix as said electron source.

75. A device for manufacturing a plate type image forming apparatus including a cathode substrate on which an electron beam source is disposed, and an image formation anode substrate disposed opposite to said cathode substrate, said device comprising:

an anode;

a high voltage power supply connected to said anode; and

detecting means for detecting abnormal discharge generated between said anode and a cathode disposed opposite to said anode by application of a high voltage from said high voltage power supply;

wherein the high voltage is applied between said cathode substrate disposed as said cathode and said anode by said high voltage power supply, and the generated abnormal discharge is detected by said detecting means to suppress said abnormal discharge during manufacturing of said cathode substrate.

76. A device for manufacturing a plate type image forming apparatus including a cathode substrate

on which an electron beam source is disposed, and an image formation anode substrate disposed opposite to said cathode substrate, said device comprising:

an anode;

a high voltage power supply connected to said anode; and

detecting means for detecting abnormal discharge generated between said anode and a cathode disposed opposite to said anode by application of a high voltage from said high voltage power supply;

wherein the high voltage is applied between said cathode substrate disposed as said cathode and said anode by said high voltage power supply, and the generated abnormal discharge is detected by said detecting means, and the potential of said anode is allowed to approach the potential of said cathode to suppress said abnormal discharge during manufacturing of said cathode substrate.

77. The device for manufacturing an image forming apparatus according to claim 75 or 76, characterized by further comprising means for electrically cutting off said anode and said high voltage power supply connected to said anode on the basis of the detection of the abnormal discharge by said detecting means.

78. The device of manufacturing an image forming apparatus according to claim 75, characterized in that said cathode substrate has a plurality of surface conduction type electron emission elements disposed in a matrix as said electron source.

79. An electron beam device characterized by being manufactured through the manufacturing method according to any one of claims 1 to 18, 21 to 25, 27 to 29 and 56 to 62.

80. An image forming apparatus characterized by being manufactured through the manufacturing method according to any one of claims 19, 20, 26, 30 to 55 and 63 to 74.

81. A method of manufacturing an electron source having a plurality of electron emission elements and wirings connected to said electron emission elements on a substrate, in which said electron emission elements includes a pair of opposite electrodes disposed on said substrate, an electrically conductive film connected to said electrodes and having a first crack in a region between said electrodes, and a deposit mainly containing carbon, having a second crack narrower than said first crack within said first crack and disposed within said first crack and in the

region of said electrically conductive film including said first crack, said method characterized by comprising the steps of:

forming said wiring and said electrode on said substrate;

forming said electrically conductive film;

forming said first crack in said electrically conductive film (forming step);

forming said deposit mainly containing carbon (activating step), said activating step being conducted after said forming step; and

applying an electric field in a direction substantially perpendicular to a surface of said substrate on which at least said wirings and said electrodes are formed where said electron emission elements are formed (conditioning step);

wherein said conditioning step is executed before said forming step.

82. The method of manufacturing an electron source according to claim 81, characterized in that said conditioning step is conducted by disposing a conditioning electrode opposite to a surface of said substrate on which said electrodes and said wirings are formed at an interval and applying a voltage between said conditioning electrode and said substrate.

83. The method of manufacturing an electron source according to claim 82, characterized in that said conditioning step is conducted after said step of forming said wirings and said electrodes on said substrate, and thereafter said step of forming said electrically conductive film is conducted.

84. The method of manufacturing an electron source according to claim 82, characterized in that said conditioning step comprises: a first conditioning step conducted after said step of forming said wirings and said electrodes on said substrate and before said electrically conductive film forming step; and a second conditioning step conducted after said electrically conductive film forming step and before said forming step;

wherein assuming that the sheet resistances of said conditioning electrode when conducting said first and second conditioning steps are R1 and R2, respectively, the values R1 and R2 satisfy R1 < R2.

85. The method of manufacturing an electron source according to claim 84, characterized by further comprising a third conditioning step of disposing said conditioning electrode opposite to a surface of said substrate on which said electrodes and said wirings are formed at an interval and applying a voltage between

said conditioning electrode and said substrate, to apply an electric field in a direction substantially perpendicular to the surface of said substrate on which said electron emission elements are formed after said forming step and before said activating step;

wherein the sheet resistance R3 of said conditioning electrode satisfies R2 < R3.

86. The method of manufacturing an electron source according to claim 85, characterized by further comprising a fourth conditioning step of disposing said conditioning electrode opposite to a surface of said substrate on which said electrodes and said wirings are formed at an interval, and applying a voltage between said conditioning electrode and said substrate, to apply an electric field in a direction substantially perpendicular to the surface of said substrate on which said electron emission elements are formed after said activating step,

wherein the sheet resistance R4 of said conditioning electrode satisfies R4 < R1.

87. The method of manufacturing an electron source according to claim 82, characterized in that said conditioning step is executed while a leader phenomenon of the discharge between said conditioning electrode and said substrate is monitored, and control

under which the potential of said conditioning electrode is allowed to approach the potential of said substrate is conducted when said leader phenomenon is detected.

88. The method of manufacturing an electron source according to claim 82, characterized in that said conditioning step is executed while voltage supply means is connected between said conditioning electrode and said substrate, a leader phenomenon of the discharge between said conditioning electrode and said substrate is monitored, and control for cutting off the connection between said conditioning electrode and said voltage applying means is conducted when said leader phenomenon is detected.

89. The method of manufacturing an electron source according to claim 82, characterized in that said conditioning step is executed by moving said conditioning electrode on said substrate, while an interval between said conditioning electrode and said substrate is held to a given value, by using the conditioning electrode having an area opposite to said substrate which is smaller than an area of the surface of said substrate on which said electron emission elements are disposed.

90. The method of manufacturing an electron source according to claim 82, characterized in that said conditioning step is executed while an interval between said conditioning electrode and said substrate is changed.

91. A method of manufacturing an image forming apparatus including an electron source having a plurality of electron emission elements and wirings connected to said electron emission elements, and an image forming member which forms an image by irradiation of an electron beam emitted from said electron source on a substrate, said electron source and said image forming member being disposed opposite to each other within an airtight vessel, in which each of said electron emission elements includes a pair of opposite electrodes disposed on said substrate, an electrically conductive film connected to said electrodes and having a first crack in a region between said electrodes, and a deposit mainly containing carbon, having a second crack narrower than said first crack within said first crack and disposed within said first crack and in the region of said electrically conductive film including said first crack, said method characterized by comprising the steps of:

forming said wirings and said electrodes on said substrate;

forming said electrically conductive film;

forming said first crack in said electrically conductive film (forming step);

forming said deposit mainly containing carbon (activating step), said activating step being conducted after said forming step; and

applying an electric field in a direction substantially perpendicular to a surface of said substrate on which at least said wirings and said electrodes are formed where said electron emission elements are formed (conditioning step); and

assembling said airtight vessel so as to include said electron source and said image forming apparatus therein;

wherein said conditioning step is executed by applying a voltage between said image forming member and said substrate after said step of assembling said airtight vessel and before said forming step.

92. The method of manufacturing an image forming apparatus according to claim 91, characterized in that said conditioning step is executed while a leader phenomenon of the discharge between said image forming member and said substrate is monitored, and control under which the potential of said image forming member is allowed to approach the potential of said substrate is conducted when said leader phenomenon is

detected.

93. The method of manufacturing an image forming apparatus according to claim 91, characterized in that said conditioning step is executed while voltage supply means is connected between said image forming member and said substrate, a leader phenomenon of the discharge between said image forming member and said substrate is monitored, and control for cutting off the connection between said image forming member and said voltage applying means is conducted when said leader phenomenon is detected.

94. A manufacturing apparatus for executing said electron source manufacturing method according to claim 89, characterized in that an area of said conditioning electrode opposite to said substrate is smaller than an area of the surface of said substrate on which said electron emission elements are disposed, and there is provided moving means for moving said conditioning electrode while an interval between said conditioning electrode and said substrate is held to a given value.

95. A manufacturing apparatus for executing the electron source manufacturing method according to claim 90, characterized by comprising interval control

means for controlling the interval between said conditioning electrode and said substrate in said conditioning step.

96. A manufacturing apparatus for executing said electron source manufacturing method according to claim 87, characterized by comprising monitoring means for monitoring a leader phenomenon of the discharge between said conditioning electrode and said substrate; and

potential changing means for making the potential of said conditioning electrode approach the potential of said substrate on the basis of a signal indicating that said monitoring means detects said leader phenomenon.

97. The manufacturing apparatus for an electron source according to claim 96, characterized in that said potential changing means comprises a switch for turning on/off a circuit that short-circuits between said conditioning electrode and said substrate.

98. A manufacturing apparatus for executing said image forming apparatus manufacturing method according to claim 92, characterized by comprising:

monitoring means for monitoring a leader phenomenon of the discharge between said image forming

member and said substrate; and

potential changing means for making the potential of said image forming member approach the potential of said substrate on the basis of a signal indicating that said monitoring means detects said leader phenomenon.

99. The manufacturing apparatus for an image forming apparatus according to claim 97, characterized in that said potential changing means comprises a switch for turning on/off a circuit that short-circuits between said image forming member and said substrate.

100. A manufacturing apparatus for executing said electron source manufacturing method according to claim 88, characterized by comprising:

monitoring means for monitoring a leader phenomenon of the discharge between said conditioning electrode and said substrate; and

connection cutoff means for cutting off the electric connection between said conditioning electrode and said voltage applying device on the basis of a signal indicating that said monitoring means has detected said leader phenomenon.

101. A manufacturing apparatus for executing said image forming apparatus manufacturing method

according to claim 93, characterized by comprising:

monitoring means for monitoring a leader phenomenon of the discharge between said image forming member and said substrate; and

connection cutoff means for cutting off the electric connection between said image forming member and said voltage applying device on the basis of a signal indicating that said monitoring means has detected said leader phenomenon.